

Show all work on a ***separate sheet*** of paper. **This review is not comprehensive, be sure to study your old notes, tests, and homework assignments!**

1. Divide the following and express the answer in the form: $q(x) + \frac{r}{\text{divisor}}$:

a) $(6x^2 - 7x - 5) \div (3x - 5)$

c) $(7x^2 - 23x + 6) \div (x - 3)$

b) $(3x^2 + 5x^3 + 1) \div (x + 2)$

d) $(x^4 - 5x + 10) \div (x + 3)$

2. Show that $(x - 2)$ is a factor of $P(x) = x^3 - 3x^2 - 10x + 24$, and find the other two factors.

3. What is the remainder when $3x^{107} + 14x^{35} - 16x$ is divided by $(x - 1)$?

4. What is the remainder when $14x^{10} - 2x^3 - 17$ is divided by $(x + 2)$?

5. Determine if $(x + 3)$ is a factor of $f(x) = x^3 + x^2 - 5x + 3$

6. Determine if $(x + 1)$ is a factor of $f(x) = x^3 - 13x^2 + 23x - 11$

7. If $(x + 16)$ is a factor of $f(x)$ then what is one of the zeros?

8. If $(2x - 3)$ is a factor of $f(x)$ then what is one of the roots?

9. If $f(x) = (x - 3)(2x - 1)(3 + x)$ then what are the roots?

10. If $f(8) = 0$, what is one of the factors of $f(x)$?

11. If $f\left(\frac{3}{2}\right) = 0$, what is one of the factors of $f(x)$?

For questions 12-15 find the complete factorization:

12. $f(x) = x^3 + 2x^2 - 8x$

13. $P(x) = x^3 - 5x^2 - 4x + 20$

14. $P(x) = x^3 - 2x^2 + 4x - 8$

15. $P(x) = 2x^5 - 28x^3 - 64x$

For questions 16-18 find the solution set of $f(x)=0$:

16. $f(x) = 3x^3 + 11x^2 + 5x - 3$; (hint: -1 is a zero)

17. $f(x) = (x^2 + 3x + 5)(2x + 3)$

18. $f(x) = 2x^5 - 28x^3 - 64x$

For questions 19-20 express the solution:

a) on a number line

b) in set builder notation

c) in interval notation

19. $\frac{5x+1}{x+3} \geq 3$

20. $\frac{x^2 - 6x + 9}{x^2 + 5x - 6} < 0$

21. Determine the equation of a cubic function whose zeros are -1, -2, and -3

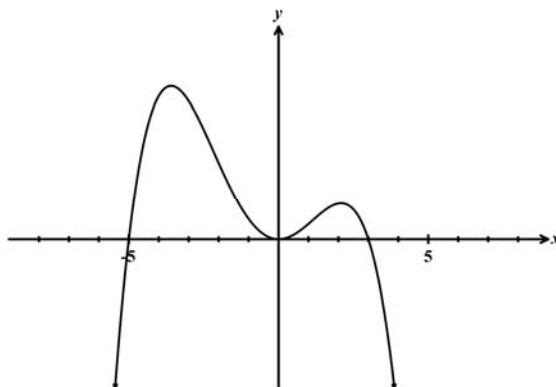
22. Which of the following could be the equation of the polynomial graph shown below?

(1) $y = -x(x+5)(x-3)$

(2) $y = x(x+3)(x-5)$

(3) $y = -x^2(x+5)(x-3)$

(4) $y = x^2(x+3)(x-5)$



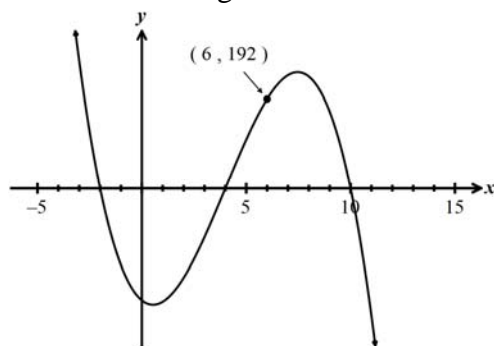
23. The cubic polynomial shown graphed below passes through the point $(6, 192)$ as shown. Which of the following is the value of the leading coefficient of the polynomial?

(1) -7

(2) -3

(3) $\frac{1}{3}$

(4) 5



24. Which of the following is a factor of the cubic polynomial $x^3 - 10x^2 + 11x + 70$?

(1) $x+10$

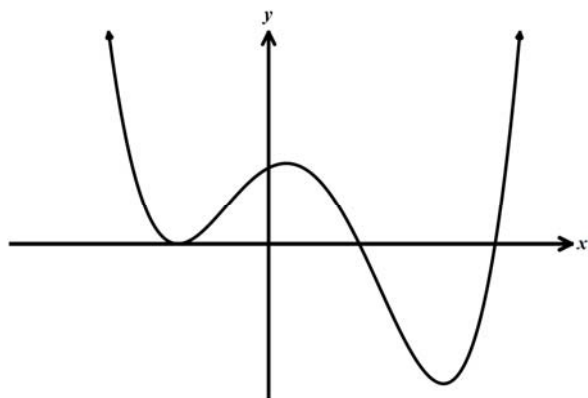
(3) $x-7$

(2) $x-2$

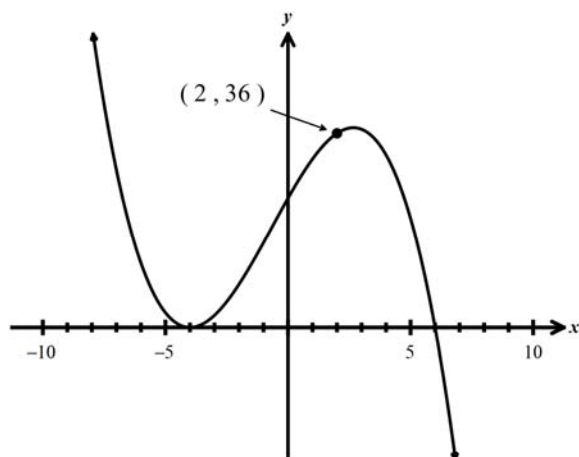
(4) $x+5$

25. Given the cubic polynomial $f(x) = x^3 - 5x^2 - 4x + 20$ answer the following.

- (a) Find the x -intercepts of this function algebraically. Show how you arrived at your answer.
 (b) Explain why the graph below could *not* represent that of $f(x)$.



26. The cubic polynomial below has zeroes at $x = -4$ and $x = 6$ only and passes through the point $(2, 36)$ as shown. Algebraically determine its equation in factored form. Show how you arrived at your answer.



27. Express the following division problem in simplest terms.

$$\frac{5x^2 + 30x}{10x^2} \div \frac{36 - x^2}{x^2 - 4x - 12}$$

28. The rational expression $\frac{4x^3 - 2x^2 + 8x + 10}{x - 5}$ can be written as $p(x) + \frac{k}{x - 5}$, where $p(x)$ is a quadratic polynomial and k is a constant.

- (a) Determine the equation for $p(x)$. Show how you arrived at your answer.
 (b) Is $x - 5$ a factor of $4x^3 - 2x^2 + 8x + 10$? Explain how your reasoning.

29. What is the solution set for the inequality $x^2 - 4x - 5 < 0$?

30. The roots of the equation $x^2 + 6x = -11$ are

(a) real, rational, and unequal

(b) real, irrational, and unequal

(c) real, rational, and equal

(d) imaginary

31. The roots of the equation $ax^2 + 4x = -2$ are real and equal when a is equal to what value?

32. Solve for x : $\sqrt{7x-3} + 3 = 2x$

33. Simplify: $\frac{\frac{a}{b} - \frac{b}{a}}{\frac{1}{a} + \frac{1}{b}}$

34. Solve for x : $\frac{7}{x} - 4 = \frac{-4x}{x+1}$

35. Express $2\sqrt{-50} - 3\sqrt{-8}$ in simplest form.